



IOWA DEPARTMENT OF NATURAL RESOURCES

LEADING IOWANS IN CARING FOR OUR NATURAL RESOURCES

EPA's Final 111(d) Emission Guidelines

Stakeholder Meeting
Iowa DNR Air Quality Bureau
September 9, 2015

EPA's Final 111(d) Emission Guidelines

- Key Changes between the proposed and final guidelines
 - Iowa's 2030 and Interim Goals
 - Summary of Best System of Emission Reductions (BSER)
 - Plan Pathways

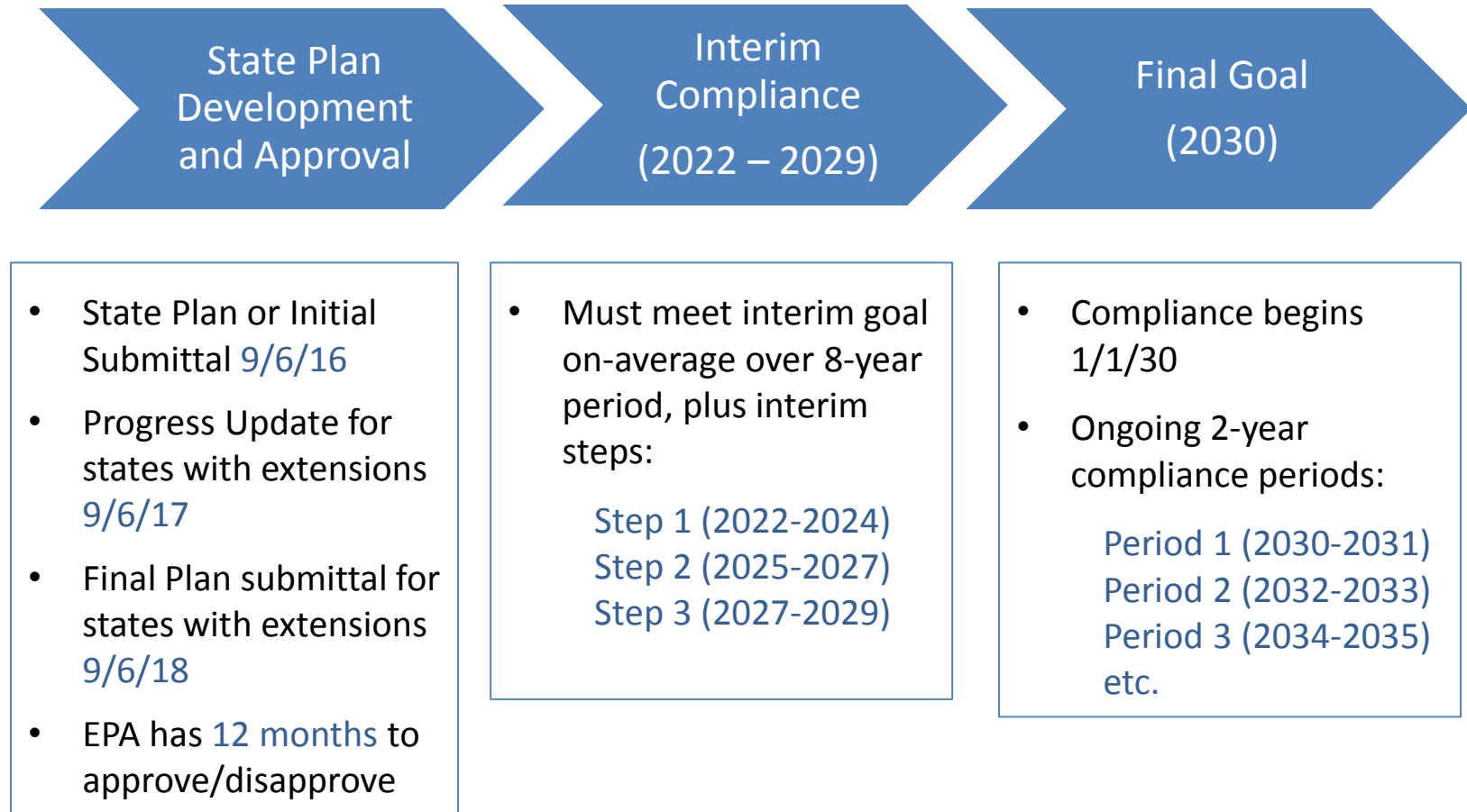


Key Changes to EPA's Final CPP Rule

Topic	Change
Timing	Interim compliance period extended 2-years, starting in 2022.
Initial compliance	EPA has added three stepped goals for interim compliance period: 2022-2024, 2025-2027, 2028-2029
Baseline	Still 2012, but with some adjustments (such as outages) for some states – (none for Iowa)
Emission Limit Approach	Best System of Emission Reduction (BSER) now a performance rate determined using a regional basis based on NERC electricity interconnections.
Emission Limit Basis	Includes heat rate improvement, increased existing NGCC dispatch, and renewables. Adds new utility-scale renewables based on potential beginning in 2013. EPA removed existing nuclear and energy efficiency.
Goal Type	Emission rate (lbs./CO ₂ Net-MWh) or EPA-determined mass cap (tons).
Early reduction credits	EPA added the Clean Energy Incentive Program (CEIP) to incentivize early investments that generate wind and solar power or reduce end-use energy demand during 2020 and 2021
Reliability	EPA requires demonstration in state plan that reliability was considered and provides safety valve for unforeseen emergencies.

Timeline

- Interim compliance period starts two years later, in 2022.



Extension for Submitting Final Plan

- States may receive a 2-year extension, regardless of whether they are submitting an individual state plan or participating in a multistate plan.
- The criteria for receiving an extension have been reduced to 3 components:
 1. Identification of final plan approaches under consideration, and progress made to date;
 2. Why additional time is needed; and
 3. Demonstration of opportunity for public comment and meaningful stakeholder engagement.
- EPA has 90 days to deny - no news is good news.

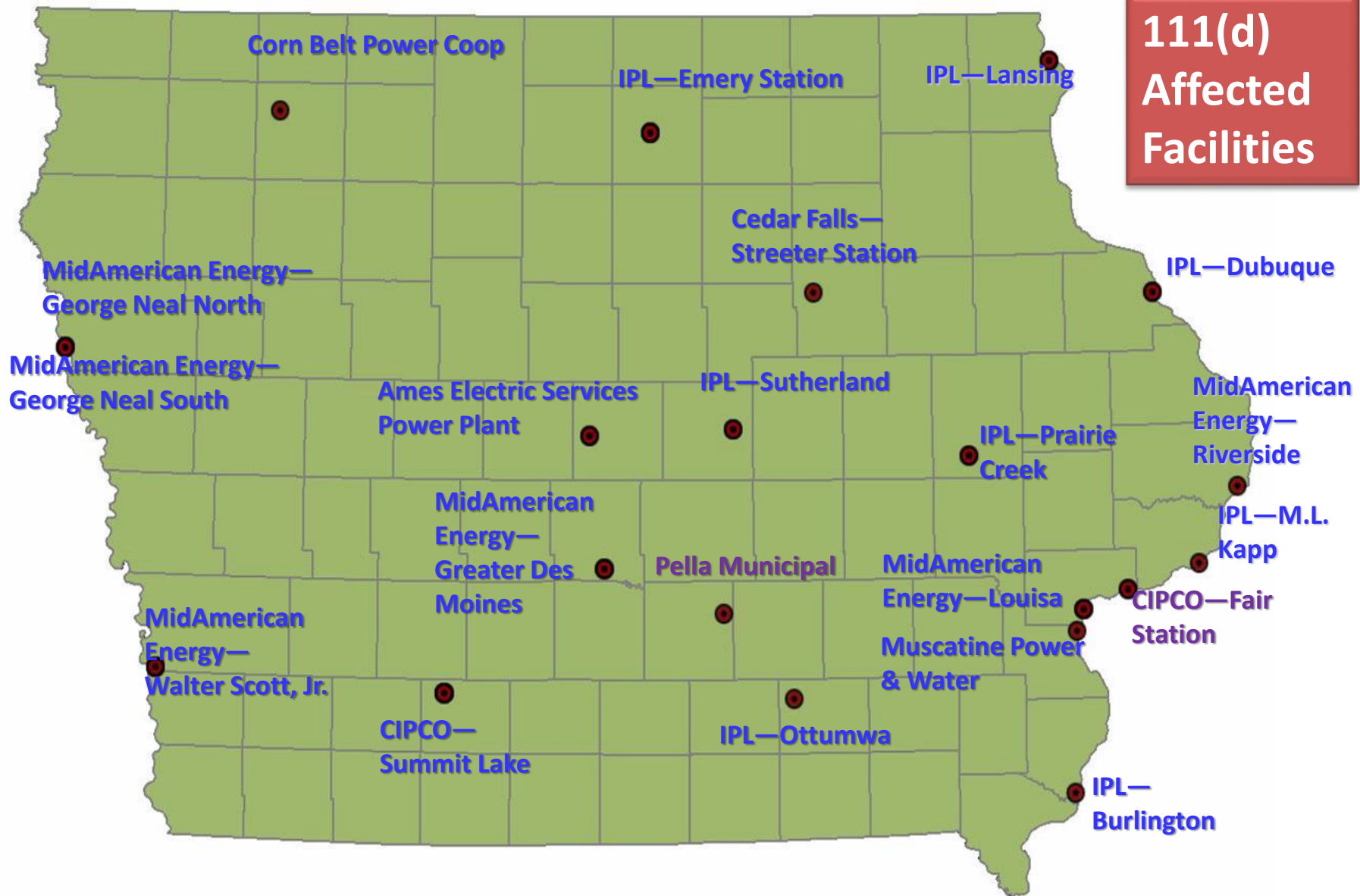
Affected Units

- Affected units are any steam generating unit, IGCC, or stationary combustion turbine that commenced construction on or before 01/08/2014 and:
 1. Serves as a generator connected to a utility power distribution system with a nameplate capacity of 25 MW-net or greater;
 2. Has a base load rating greater than 250 MMBtu/hour heat input fossil fuel; and
 3. Stationary combustion turbines that meet the definition of either a combined cycle or combined heat and power combustion turbine.
- Iowa's list of affected facilities has not changed (21), but we believe the number of affected units has been reduced from 42 to 37 units.

Affected Units (continued)

- EGUs may be excluded from being affected units per §60.5850 if they are:
 - Subject to the 111(b) standards (40 CFR 60 Subpart TTTT) because of their date of construction or became subject to Subpart TTTT because of modification or reconstruction.
 - Steam units and IGCC units that are currently and have always been subject to a federally enforceable permit limiting annual net-electric sales to 1/3 or less of its potential electric output, or 219,000 MWh or less;
 - Non-fossil units that have always historically limited the use of fossil fuels to 10% or less of the annual capacity factor, or are subject to a federally enforceable permit limiting fossil use to 10% or less of the annual capacity factor.

111(d) Affected Facilities



Iowa Goals



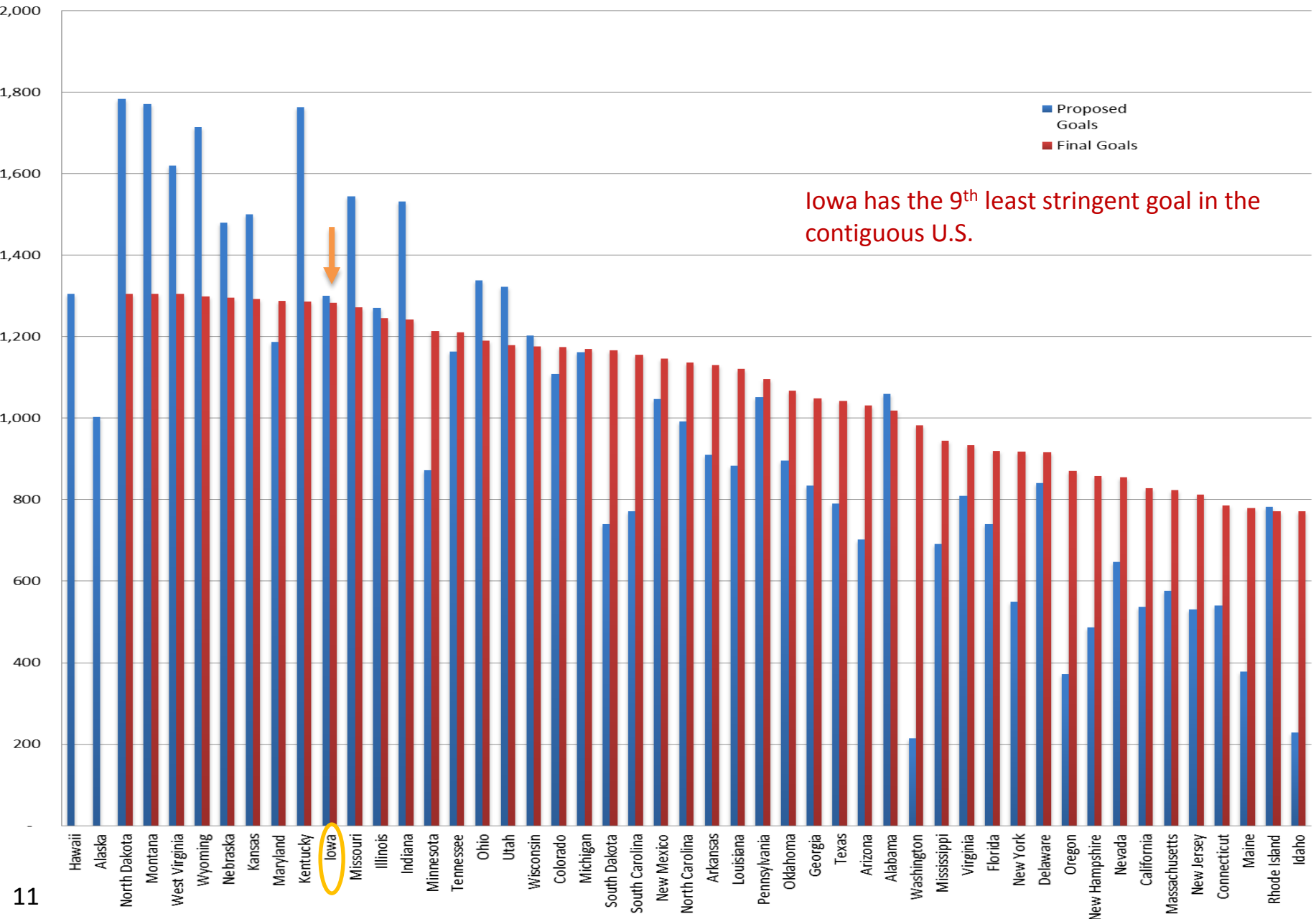
New Iowa Goals

- New “subcategory” Emission Performance Rates - nation-wide
 - **1,305 lbs. CO₂/MWh*** for fossil fuel-fired steam generating units
 - **771 lbs. CO₂/MWh*** for stationary combustion turbines
- New Iowa Goals:

Goal Type	Timing	Units Covered	Proposed	Final
Rate	Interim (2022-2029)	existing affected units	1,341 lbs./MWh*	1,505 lbs./MWh*
Rate	2030 Final		1,301 lbs./MWh*	1,283 lbs./MWh*
Mass	Interim (2022-2029)	existing affected units	24,088,889 tons	28,254,411 tons
Mass	2030 Final		23,358,609 tons	25,018,136 tons
Mass	Interim (2022-2029)	existing affected units + new source complement	-	28,553,345 tons
Mass	2030 Final		-	25,281,881 tons

Source: NACAA

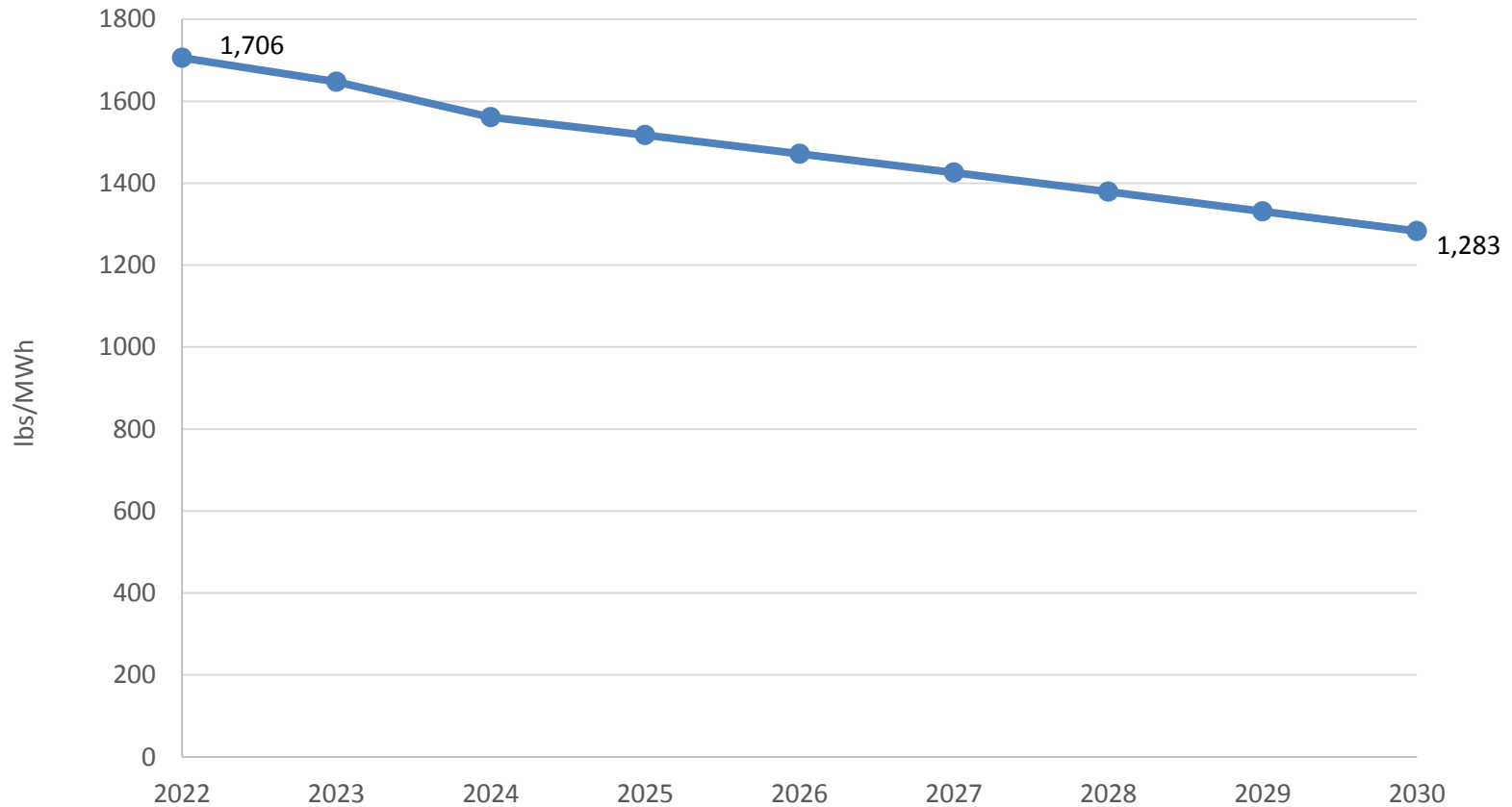
CPP State Emission Rate Targets (Sorted by Final Goal Stringency)



Glide Path – Rate-based Goals

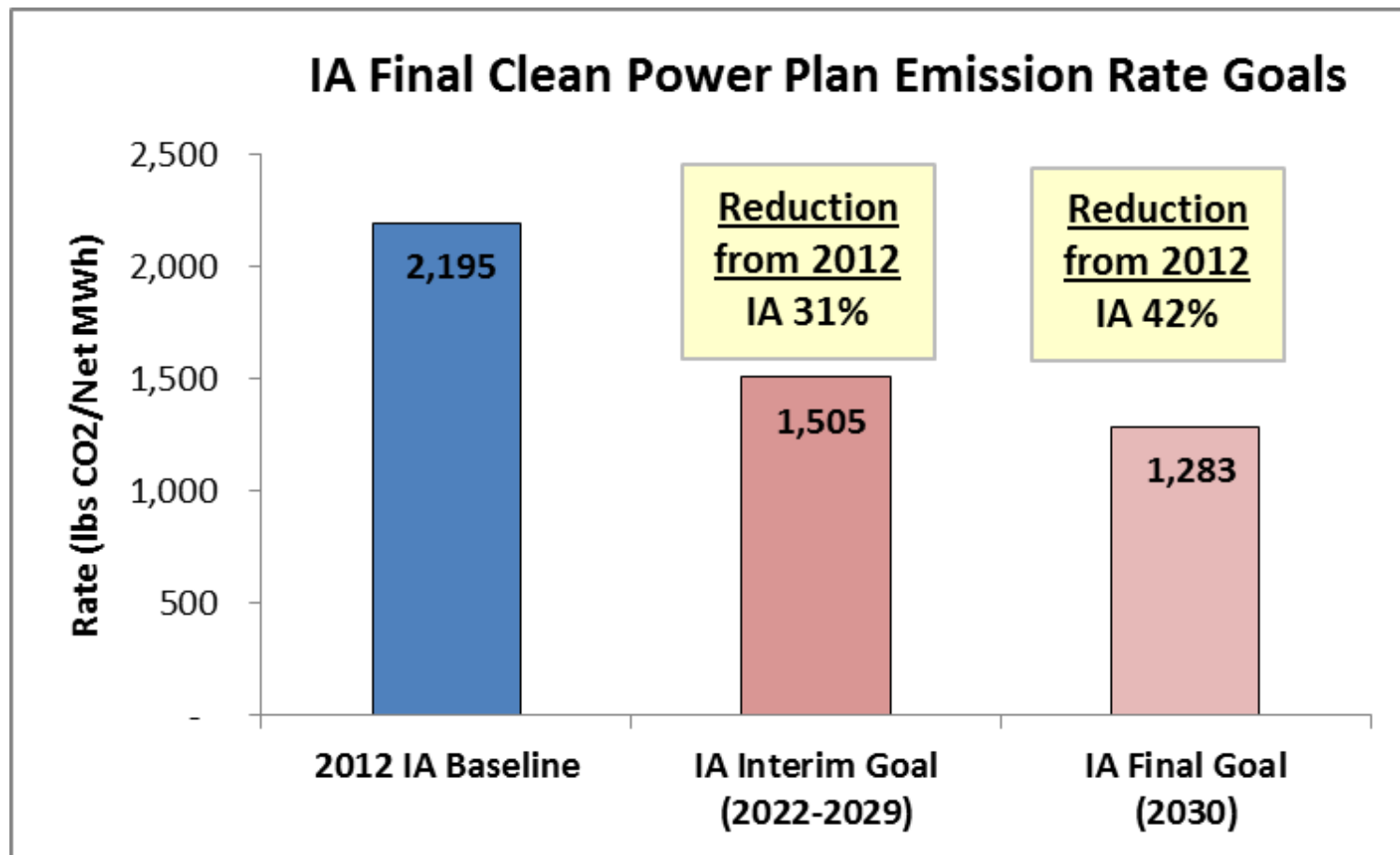
2012 = 2,195 lbs./MWh

Iowa Rate Goals (lbs./MWh)



Source: EPA CPP State Goal Visualizer

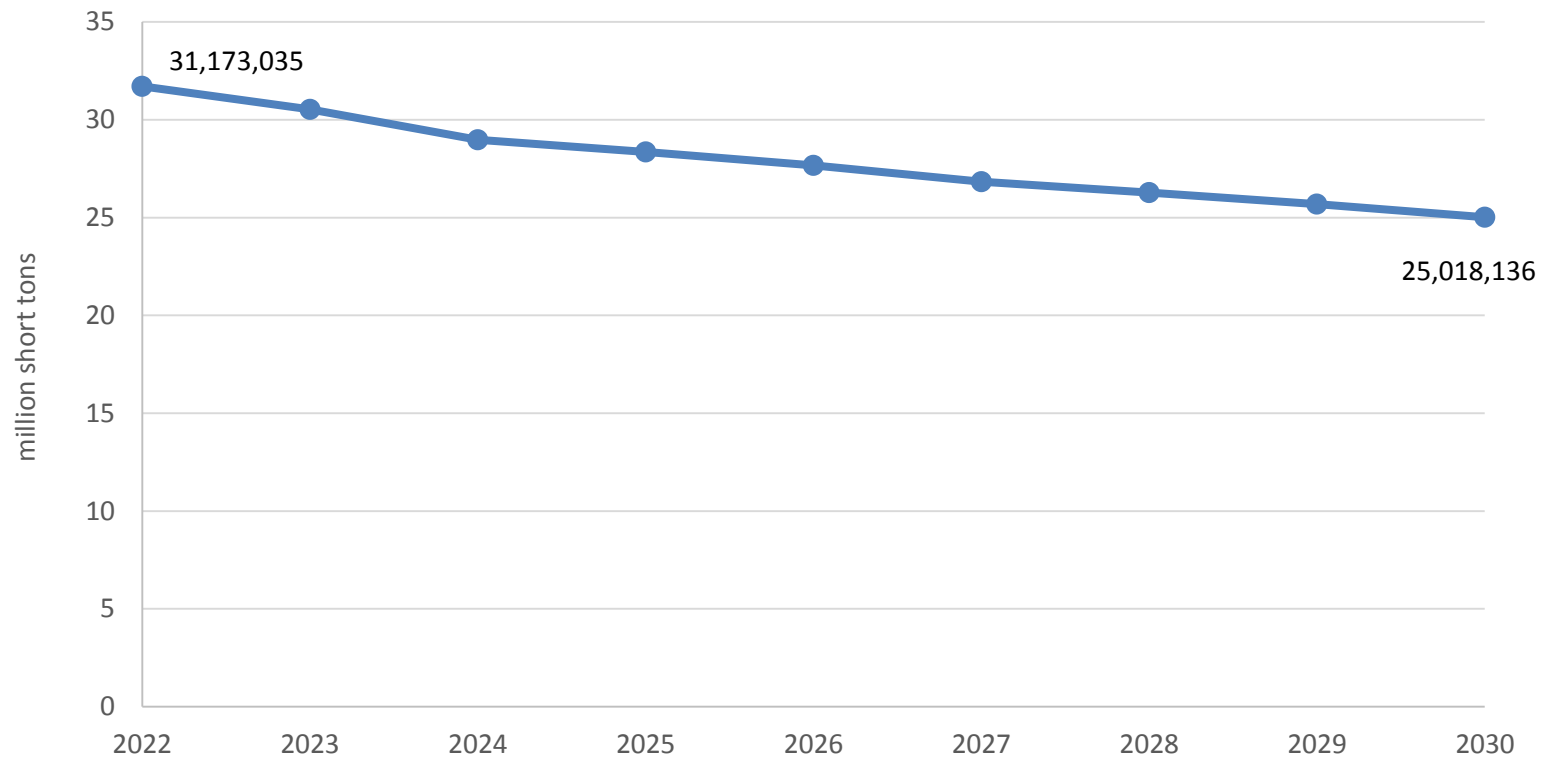
Iowa Rate Goals



Glide Path – Mass-based Goals

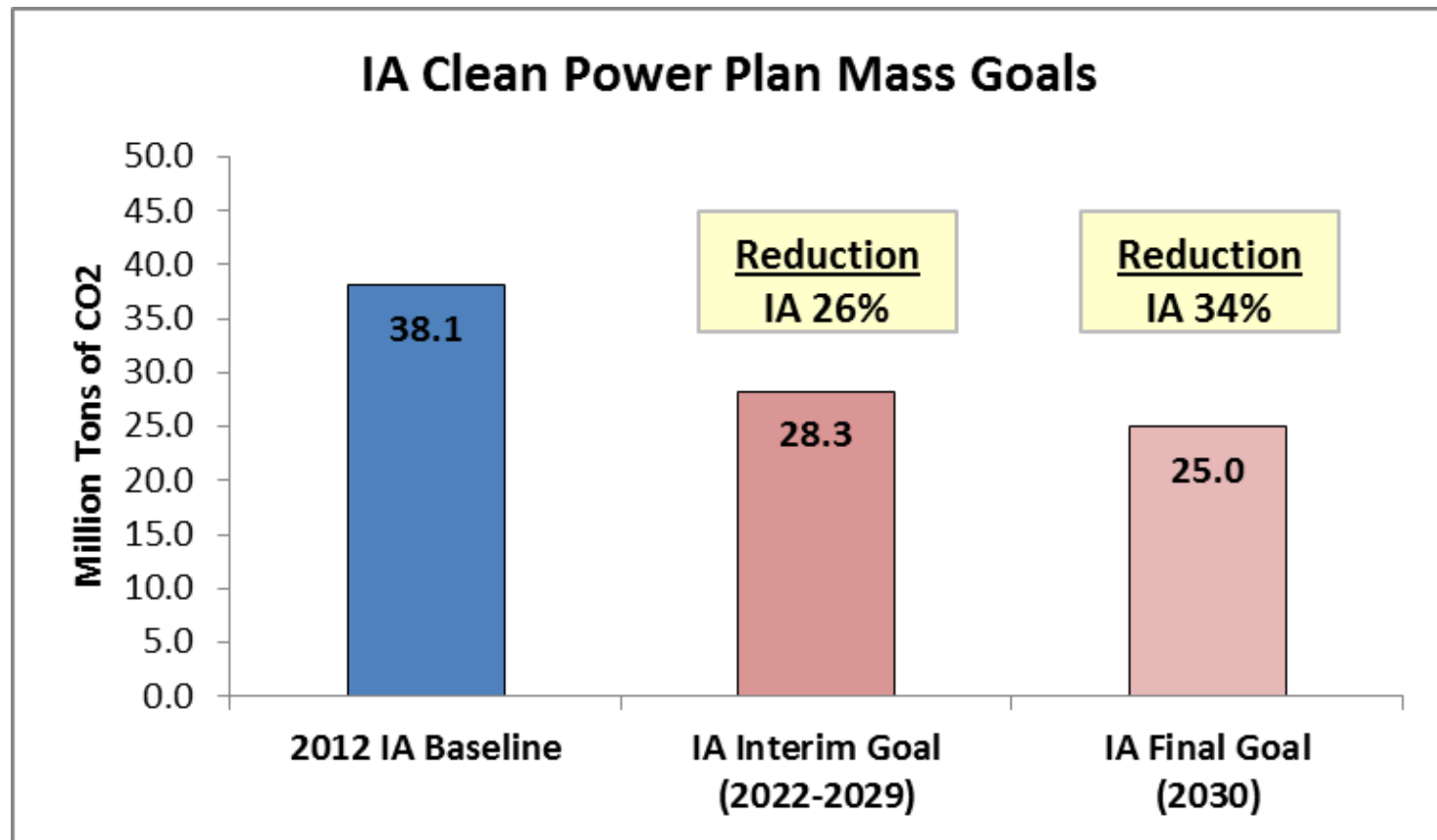
Iowa Mass Goals (million short tons)

2012 = 38,135,454 tons



Source: EPA CPP State Goal Visualizer

Iowa Mass Goals



Best System of Emission Reduction



Best System of Emission Reduction (BSER)

- State-level data is aggregated to the regional level – 3 interconnections
- The building blocks are then applied at the regional level, not the state level.
- EPA then determined individual “subcategory” performance rates for fossil steam and natural gas combined cycle (NGCC) for each region, and selected the least stringent as BSER.
- BSER and the goal calculations may be a topic for a future stakeholder meeting.

Heat Rate Improvement

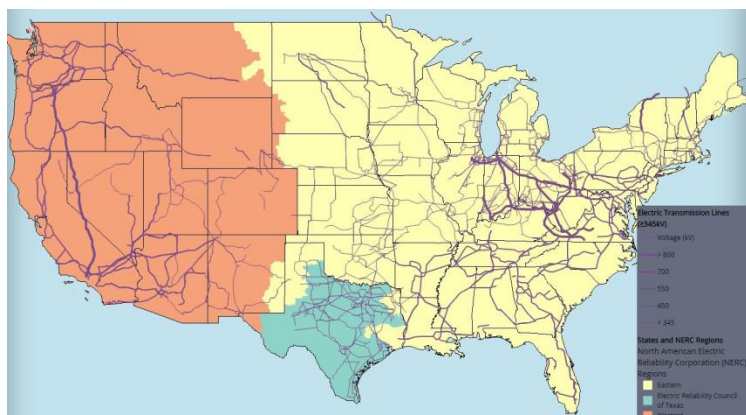
4.3% East
2.3% West
2.1% Texas

Add New Utility-Scale Renewables

(technical/economic
potential after 2012)

Increase Dispatch of Existing NGCC

(75% Net Summer
Capacity)



EPA's BSER Performance Rate for 111(d) Units (lbs CO₂/Net-MWh)

Region	Existing Coal	Existing NGCC
Eastern	1,305	771
Western	360	690
Texas	237	697

Building Block #1 - Heat Rate Improvement (HRI)

- Heat rate is the amount of fuel energy input needed to produce 1 KWh of net electrical output.
- HRI changed from 6% in proposed rule to a separate rate for each interconnection:
 - **Eastern Interconnection: 4.3%**
 - Texas Interconnection: 2.3%
 - Western Interconnection: 2.1%
- HRIs were calculated by using 2012 as a baseline, then comparing it to the best historical gross heat rate of each EGU in the region.
- EPA stresses that Block 1 should be implemented in combination with the other building blocks.

Building Block #2 – Shifting Generation from Fossil Steam to Existing NGCC

- Proposed Rule:
 - 70% **nameplate capacity** factor for existing and under construction natural gas combined cycle (NGCC)
 - Achieved by 2020
- Final Rule:
 - 75% **summer capacity** factor for existing and under construction NGCC
 - Represents a unit producing $\frac{3}{4}$ of the electricity it could have produced in that time had it utilized its entire capacity
 - Achieved in 2030, with glide path from 2020
 - Applied after Building Block 3 when setting goals

Building Block #3 – Shifting Generation to Renewables

- Proposed Rule:
 - No retirement of “at risk” nuclear capacity; included under construction nuclear
 - Regional RE generation targets derived from existing RPS goals and applied to each state
- Final Rule:
 - Used on-shore wind, utility scale solar photovoltaic, concentrating solar power, geothermal, and hydropower
 - Nuclear is no longer included in BSER (can use as compliance option)
 - Incremental RE only
 - Used National Renewable Energy Laboratory (NREL) studies
 - 25% increase in RE potential; based on economic modeling
 - Applied at regional interconnection level
 - Incremental RE was calculated using 7 steps (see p. 755 of final rule)

~~Building Block #4~~ – No longer exists

- Proposed Rule:
 - Annual improvement of 1.5% demand-side energy efficiency
- Final Rule:
 - Demand-side Energy efficiency was not included in BSER
 - Can still be used as a compliance option

Goal Calculations (continued)

- Recommend looking at the [Clean Power Plan State Goal Visualizer Tool](#) located in EPA's Clean Power Plan Toolbox

Clean Power Plan Goal Calculation Viewer

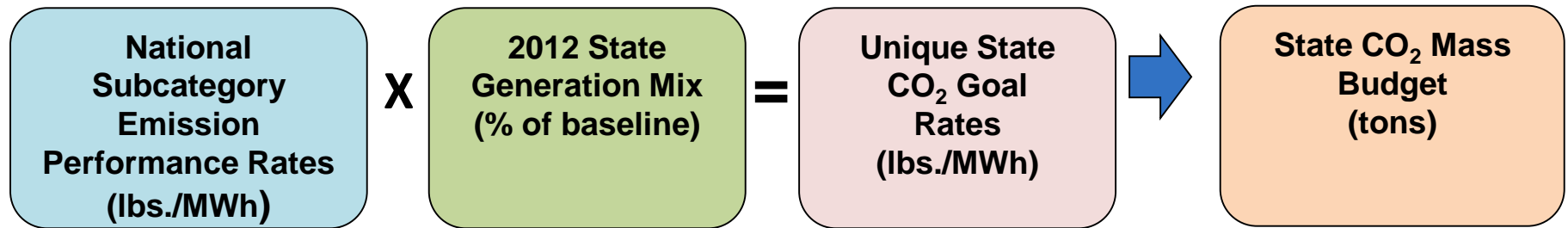
Step 2: Aggregate the adjusted historical emissions and generation to a regional level for coal steam, OG steam, and NGCC technology categories

Once EPA has the adjusted state-level generation and emission for each state from step 1, it summed the state totals for all states in the same region to derive regional totals. EPA kept the technology-source categories separate at this stage to evaluate BSER impacts separately for each source category. These category-specific values become the basis for calculating the category-specific performance emission rates and subsequent state goals.

Regional Baseline (2012)						
	Coal		NGCC		OG Steam	
Inter-connection	Emissions (1000 short tons)	Net Generation (GWh)	Emissions (1000 short tons)	Net Generation (GWh)	Emissions (1000 short tons)	Net Generation (GWh)
Eastern	1,356,066	1,230,448	328,220	734,535	52,979	74,241

EPA's New BSER Goal Calculation

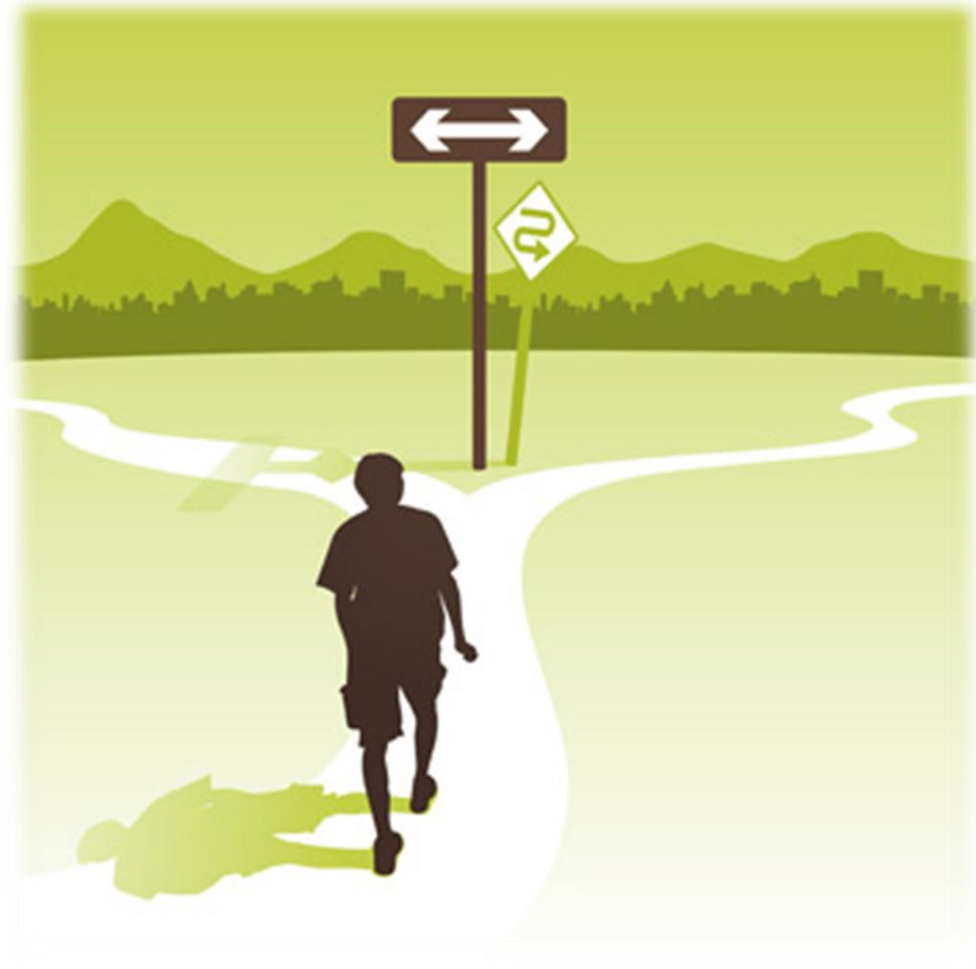
- National “subcategory” performance rates were applied to each state based on 2012 generation mix.
 - Iowa’s 2012 mix was 96% coal and 4% natural gas



Iowa Calculation

= (1,305 Fossil Steam national rate X 96%) +(771 NGCC national rate X 4%) =
= 1,283 lbs. CO₂/MWh

State Plan Pathways



State Plan Pathways

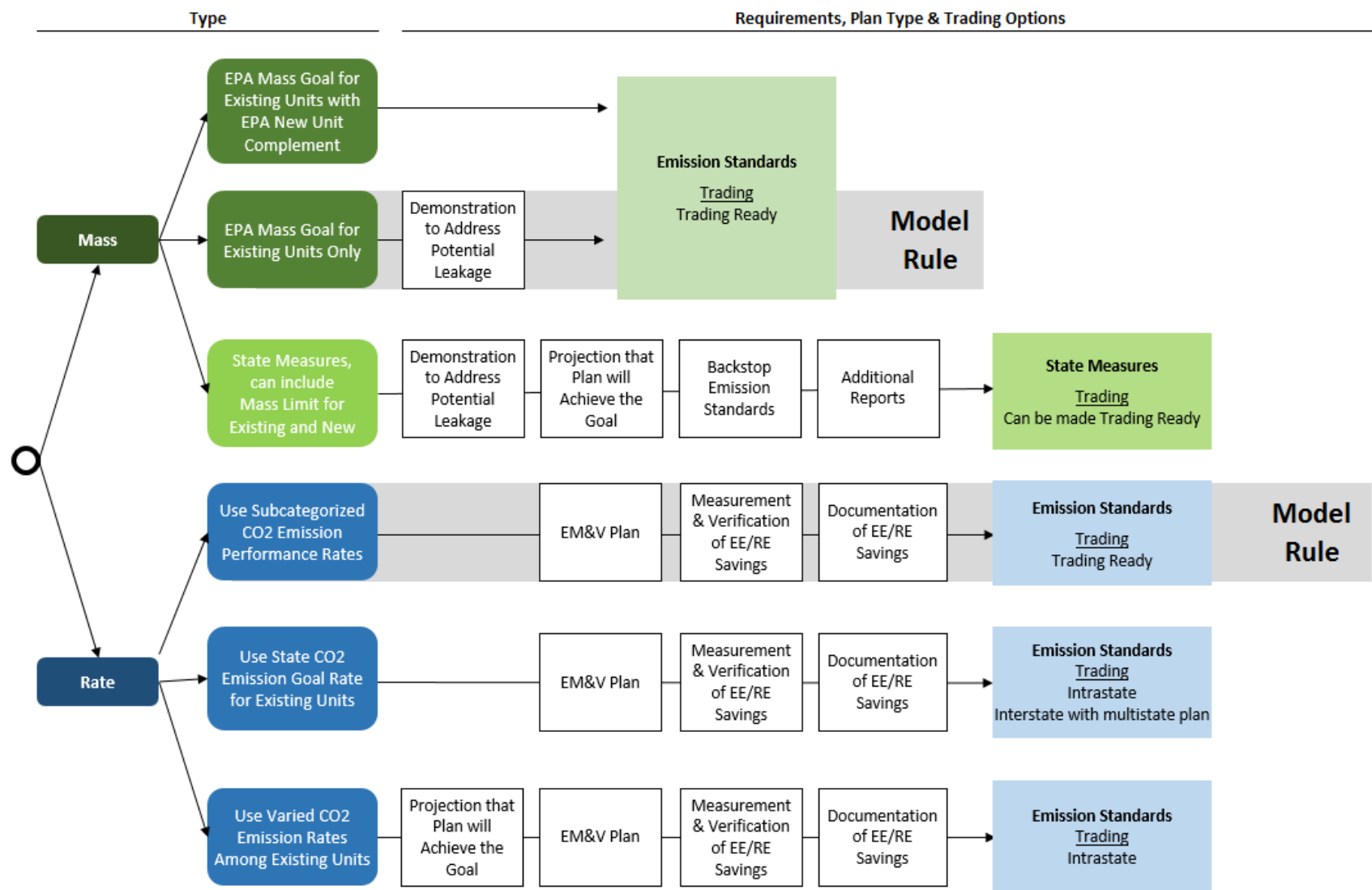
1. Emission Standards Plan –

- Federally enforceable emission standards on affected EGUs
 - Can use CO₂ “subcategory” emission performance rates, state goal, or varied emission rates

2. State Measures Plan –

- State includes, at least in part, measures implemented by the state that are not included as federally enforceable emission standards
- Designed to achieve the state mass-based goal
- Ready path forward for states currently implementing mass-based trading programs
- May require legislation
- Includes federally enforceable measures as a backstop
 - Emission standards that would go in effect if state measures aren't meeting the goal

State Plan Pathway Options



Rate-based Plans Overview

- Sources must meet emission standard set by the final rule.
- If sources emit above the emission standard, they must acquire a sufficient number of emission rate credits (ERCs) to bring them into compliance.
- Emission Rate Credits (ERCs)
 - Unit of trade for a rate-based program, produced in MWh for:
 - Low or no-emissions resources installed in 2013 or thereafter, or
 - Affected unit generation below subcategory rate, or
 - Incremental NGCC generation (gas-shift ERCs)
 - ERCs only accrue after 2022 (Earlier if participating in CEIP)
 - ERCs can be banked indefinitely
 - Gas-shift ERCs can only be used by coal units in a plan using subcategory rate goals

Rate-based Plans (continued)

- ERCs may be issued to:
 - Measures that are installed after 2012, but
 - Only the quantified and verified MWh of electricity generation or electricity savings they produce in 2022 and future years can be used to adjust a CO₂ emission rate.
 - Examples:
 - Renewables (wind, solar, geothermal, hydro, wave, tidal),
 - New or uprated nuclear, Qualified biomass,
 - Waste-to-energy, Combined heat and power,
 - Energy efficiency, Transmission & distribution improvements
 - Cannot be issued to energy storage or new stationary sources.
- The final rule also includes the Clean Energy Incentive Plan (CEIP), which gives additional credits to early investments that generate wind and solar power or reduce end-use energy demand during 2020 and 2021
- ERCs may be a good topic for a future meeting.

Using ERCs to Achieve Compliance

CO₂ Emission Rate =

Measured CO₂ emissions (pounds)

Total net energy output (MWh) + ERC replacement generation for an EGU (MWh)

Hypothetical Example:

A coal-fired unit emits 230,000,000 pounds of CO₂ during the compliance period, generates 100,000 MWh of net electricity and owns ERCs from renewable sources equal to 100,000 MWh.

The unit's adjusted CO₂ Emission Rate = $\frac{230,000,000 \text{ lbs.}}{(100,000 + 100,000) \text{ MWh}^*}$

= 1,150 lbs. CO₂/MWh*

Emission rate would otherwise be 2,300 lbs. CO₂/MWh* without ERCs

Rate-based Plan Pathways

1. Use Subcategorized CO₂ Emission Performance Rates

(771 lbs./MWh for turbines; 1305 lbs./MWh for steam generating units - nationwide)

– Trading Options:

- Intrastate trading ???
- Interstate trading - Trading Ready

– EPA Model Rule

– Plan must include:

- Evaluation measurement & verification (EM&V)
- Measurement & verification (M&V) and documentation of EE/RE savings

2. Use State CO₂ Emission Goal Rate for Existing Units

(1,283 lbs./MWh for all affected units - Iowa)

– Trading Options:

- Intrastate
- Interstate - with multistate plan (weighted average)

– Plan must include:

- Evaluation measurement & verification (EM&V)
- Measurement & verification (M&V) and documentation of EE/RE savings

Rate-based Plan Pathways (continued)

3. Use Varied CO₂ Emission Rates Among Existing Units

- Trading Options:
 - Intrastate trading
- Plan must include:
 - Projection that plan will achieve the goal
 - Evaluation measurement & verification (EM&V)
 - Measurement & verification (M&V) and documentation of EE/RE savings

Mass-based Plans Overview

- EPA gives state an emissions budget of how many tons of CO₂ can be emitted by affected EGUs.
- State can choose how to distribute the allowances.
 - 1 allowance = 1 short ton of CO₂ emitted during compliance period.
- EGUs must have a sufficient number of allowances at the end of the given compliance to cover their actual emissions.
- Allowances may be traded and banked; a portion of allowances may be set-aside by the state.
- If using the new source complement, leakage does not have to be addressed.

Mass-based Plan Pathways

1. EPA Mass Goal for Existing Units with EPA New Unit Complement

(25,281,881 tons)

- Trading Options:
 - Intrastate ???
 - Interstate: Trading Ready
- **EPA Model Rule???**

2. EPA Mass Goal for Existing Units Only (25,018,136 tons)

- Trading Options:
 - Intrastate
 - Interstate: Trading Ready
- **EPA Model Rule**
- Plan must address potential leakage
 - Where shifts in generation to unaffected fossil fuel-fired sources result in increased emissions, relative to what would have happened had generation shifts consistent with the BSER occurred
 - Results in higher emissions

Mass-based Plan Pathways (continued)

3. State Measures, Can Include Mass Limit for Existing and New

- Ideal for states that are already trading – RGGI and California
- Trading Options: Can be made Trading Ready
- Plan must:
 - Address potential leakage
 - Include projection that it will achieve the goal
 - Include backstop emission standards in case state measures fail to achieve compliance
- Additional reporting required

Multistate Coordination

- States may participate in more than one multistate plan.
- A subset of affected EGUs in a state may participate in a multistate plan.
- Midcontinent States Environmental and Energy Regulators (MSEER)
 - Regional stakeholder workshop on October 19th in Little Rock, Arkansas
 - See for <http://bipartisanpolicy.org/events/understanding-the-final-clean-power-plan-implications-for-implementation-in-the-midcontinent-states/> to register or for webcast

Reliability

- Plan must include demonstration that the reliability of the electrical grid has been considered (new).
- Reliability safety valve (new)
 - Triggered when there is conflict between the requirements of the state plan and maintaining electric system reliability due to catastrophic or unforeseen events
 - When triggered, a source is exempted from the applicable emission standards for 90 days.
 - During the 90 days, the source must meet an alternative emission standard that will not jeopardize grid reliability.
 - If the reliability issue cannot be resolved, the state must revise their plan to address the reliability issue.

Current Litigation

- West Virginia, No. 15-1277 filed in U.S. Court of Appeals for the DC Circuit
 - Emergency request by 15 states to stay the Clean Power Plan
 - EPA argues premature because the CPP has not been published in the Federal Register
 - DC Circuit rejected a similar challenge to the proposed CPP because a final rule had not been published yet

For More Information

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DNR Website:

<http://www.iowadnr.gov/111d>

EPA Clean Power Plan Website:

<http://www2.epa.gov/carbon-pollution-standards>

EPA Toolbox (including Visualizer Tool)

<http://www2.epa.gov/cleanpowerplanttoolbox>